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Neu eingegangene Arbeiten

K. E. G. Löbner, J. Klöckner, H. Schimmer, and P. Kienle, Physik-Department der Technischen Hochschule München:

Level Scheme of ^{198}Au from γ-γ-Coincidence Measurements

Prompt and delayed low energy γ-γ-coincidences from the ^{197}Au$(n, \gamma)^{198}$Au reaction have been measured with Ge(Li) and NaI(Tl) detectors at the external neutron beam of the research reactor (FRM) near Munich. A level scheme consistent with all available experimental data is constructed and discussed. The half-life of the 367.29 keV level was obtained with a time-to-amplitude converter to be 123 ± 4 ns. It determines the absolute transition probability of the 97.211 keV $E1$ transition.

D. L. Misell, Department of Physics, Queen Elizabeth College, Campden Hill Road, London, W. 8., England:

The Calculation of Optical Data from Electron Energy Loss Measurements

A method is given for the calculation of $-\mathrm{Im}\, 1/\varepsilon$ from electron energy loss data. The observed energy loss spectrum, and its variation with the angle of scattering, is corrected for plural electron scattering (including elastic-inelastic events). The method requires no assumptions about the behaviour of the angular variation of the energy loss spectrum, but the angular variation of the zero loss (unscattered and elastically scattered) electrons is required.

F. Fehsenfeld, D. Schalch, A. Scharmann, I. Physikalisches Institut der Universität Gießen:

Zur Darstellung der Reichweite-Energie-Beziehung von Ionen (Representation of Range-Energy Relations of Ions)

Previous published penetration depths-energy-relations are represented in a reduced manner by the theories of Lindhard, Scharff and Schiott and of Oen, Holmes and Robinson. Results are discussed.

A. Hese, Institut für Kernphysik der Technischen Universität Berlin:

Experimentelle Untersuchung der $5d\,6s\,6p\,z\,{}^2F_{5/2,7/2}$-Terme im Lanthan I-Spektrum unter Verwendung von Levelcrossing-Spektroskopie (Levelcrossing-Experiments to Investigate the Hyperfinestructure and the Lifetime of the $5d\,6s\,6p\,z\,{}^2F_{5/2,7/2}$-States in the Lanthanum I-Spectrum)

The hyperfinestructure-interaction-constants A/g_J and B/g_J of the $5d\,6s\,6p\,z\,{}^2F_{5/2,7/2}$ terms in the La I-spectrum were measured by levelcrossing technique. Using a La-atomic beam many levelcrossings between magnetic sublevels with $|\Delta m| = 2$ were detected in both terms by resonance scattering. Values for the lifetime of each state were deduced from the widths of Hanle-effect- and levelcrossing-signals.

E. Bashandy, Atomic Energy Establishment, Caire — U.A.R.:
Contributions of the Decays of ^{109}Pd and ^{199}Pt

The gamma decays of the 13.5 h ^{109}Pd to levels in ^{109}Ag and those of 30 min ^{199}Pt to levels in ^{199}Au, have been studied with the use of both Ge(Li) gamma-ray and a high resolution iron free double focusing beta-ray spectrometers. The K-conversion coefficients and multipolarities of gamma-rays were determined. Spin and parity assignments for mest of the levels were given on the basis of the conversion coefficients. The level structures of ^{109}Ag and ^{199}Au are discussed in terms of existing nuclear models.

S. Buhl and H. U. Fahrbach, II. Physikalisches Institut der Universität Heidelberg:
Spin Assignment for the 1.89 MeV Level in ^{42}Sc

The gamma decay mode and the spin value of the 1.89 MeV state of ^{42}Sc were investigated by studying the ^{40}Ca(^{3}He, $p\gamma$)^{42}Sc reaction at 10.0 MeV energy of the incident ^{3}He beam. The analysis of the p-γ angular correlation of the 1.89 MeV ground state transition — using method II of Litherland and Ferguson — yields the spin assignment $J=1$ for this level.

A. Jabs and G. Wibberenz, Institut für Reine und Angewandte Kernphysik der Universität Kiel:
Absolute Calculation of Secondary Cosmic Gamma Rays at the Top of the Atmosphere

Starting from the primary nucleon and the primary electron spectra the vertical secondary gamma spectra in $0-30\,g/cm^2$ atmospheric depth and the energy range $1-1000$ GeV are calculated and compared with experimental data. The calculated spectra largely depend on the properties of the primary-nucleon-air-nucleus collision. The collision model is considered in detail. The influence of the relevant collision parameters, which are not very well known, on the gamma spectra is studied. In addition the influence of the solar cycle and of the geomagnetic cutoff is shown. The conventional values of collision parameters together with a lowered primary nucleon the spectrum, as suggested by recent measurements by Schmidt *et al.*, give theoretical gamma spectra which lie within the wide range of the experimental data. In the same the above assumptions can help to remove a discrepancy noticed a few years ago between measured and calculated muon and nucleon spectra in the atmosphere.

H. Schneider und U. Weng, Strahlenzentrum der Universität Gießen:
Messung der Paarkonversionskoeffizienten von ^{59}Co (Measurement of the Internal Pair Formation Coefficients in ^{59}Co)

Internal pair formation propabilities in ^{60}Ni and ^{59}Co have been determined by a positron annihilation method. The electrons from the β^--decay of ^{59}Fe were measured in triple coincidence with annihilation quanta originating from pairs produced in the deexcitation of the ^{59}Co nucleus. By this triple coincidence technique it was possible to measure separately the pair formation coefficients Γ for transitions in ^{59}Co. The observed values

$$\Gamma_{1.29}=(3.7\pm0.4)\times10^{-5} \quad \text{and} \quad \Gamma_{1.10}=(0.5\pm0.1)\times10^{-5}$$

are in agreement with theoretical calculations for $E2$-radiation.

G. C. Nelson and B. G. Saunders, Lawrence Radiation Laboratory, University of California, Livermore, California, USA and **S. I. Salem,** California State College, Long Beach, California, USA:

Energies of the $K\alpha_1$, $K\alpha_2$, $K\beta_1$, and $K\beta_3$ X Rays and the K-shell Binding Energies in Np, Pu, and Am

The energies of the $K\alpha_1$, $K\alpha_2$, $K\beta_1$, and $K\beta_3$ X rays in Np, Pu, and Am have been measured with a Cauchois-type bent-crystal spectrometer. The K-shell binding energies have been determined by combining the measured $K\alpha$ and $K\beta$ X-ray energies with the previously determined L_{11}, L_{111}, M_{11}, and M_{111} binding energies. The $L_{11}-L_{111}$ and $M_{11}-M_{111}$ binding energy differences obtained from the $K\alpha_1-K\alpha_2$ and $K\beta_1-K\beta_3$ X-ray energies agree, within the experimental error, with the differences obtained from the L_{11}, L_{111}, M_{11}, and M_{111} binding energies previously reported.

K.-J. Willkomm und H. V. Klapdor, I. Institut für Experimentalphysik der Universität Hamburg:

Proton-Gamma-Winkelverteilungen an der Reaktion $^{19}F(p, \alpha\gamma)^{16}O$ (Proton-Gamma Angular Distributions in the Reaction $^{19}F(p, \alpha\gamma)^{16}O$)

The angular distributions of the 6.13 MeV γ_1 transition in the reaction $^{19}F(p, \alpha\gamma)^{16}O$ have been measured with improved accuracy at proton energies of 873 keV and 1,374 keV using a Ge(Li) detector. The results can be fitted by Legendre polynom series with

$$a_2 = -0.018 \pm 0.008; \quad a_4 = 0.000 \pm 0.008 \quad \text{at} \quad E_p = 873 \text{ keV}$$

and

$$a_2 = -0.130 \pm 0.005; \quad a_4 = +0.004 \pm 0.004 \quad \text{at} \quad E_p = 1374 \text{ keV}.$$

From the measured Legendre coefficients α_1-angular momentum mixing ratios are extracted and compared with the results from (p, α_1) and (α_1, γ_1) correlations.

H. Vonach und M. Hille, Physik-Department der Technischen Hochschule München und **G. Stengl und W. Breunlich,** Institut für Radiumforschung und Kernphysik der Österreichischen Akademie der Wissenschaften Wien und **E. Werner,** International Atomic Energy Agency Seibersdorf:

Präzissionsmessung des $Al^{27}(n, \alpha)$-Wirkungsquerschnitts für 14,43 MeV Neutronen (Precision-Measurement of $Al^{27}(n, \alpha)$-Cross-Section for 14.43 MeV-Neutrons)

A precision measurement of the $Al^{27}(n, \alpha)Na^{24}$ — cross-section for 14.43 MeV was performed. Aluminium samples were irridiated in an accurately known neutron flux determined by the associated particle method. The induced Na^{24} activity was measured with a scintillation detector accurately calibrated by means of Na^{24} standards by the β-γ-coincidence method. By means of careful minimizing all sources of systematic errors an overall accuracy of 0.7% on a 99.5 (3σ) confidence level was obtained. The measurements result in a cross-section of 117.0 mb for $Al^{27}(n, \alpha)Na^{24}$ for neutrons of an average energy of 14.43 MeV and an energy width of approximately 0.2 MeV.

I. I. Bondouk, F. Machali and Z. A. Saleh, Atomic Energy Establishment, Cairo, Egypt, U.A.R.:

Polarization of Protons in $C^{12}(d, p)C^{13}$ Reaction

The angular distributions of the polarization of protons from $C^{12}(d, p)C^{13}$(g.s.) reaction were measured at 200 keV intervals for deuteron energies from 1.40 to 2.40 MeV. Elastic scattering on C^{12} at 45° (lab) was used to analyze the polarization. Positive sign of the polarization corresponds to the vector product $\boldsymbol{K}_d \times \boldsymbol{K}_p$. The maximum polarization observed is about 30%. The results are not similar to those obtained from the mirror reaction $C^{12}(d, n)N^{13}$ in the same deuteron energy range.

R. Kragler and D. Fick, Physikalisches Institut der Universität Erlangen-Nürnberg:
On the Theory of 2-Nucleon-Transfer-Reactions

The formalism of 2-nucleon-transfer-reactions developed by Glendenning and Lin is slightly generalized using a cluster model description for incoming and outgoing particles in a consistent way. The choice of an adequate spin-dependent nucleon-nucleon interaction of Gaussian radial form permits an analytic evaluation of the intrinsic matrix element. A relative *s*-state motion for the nucleon pair transferred leads to an additional restriction of the reaction model. Further, the polarization of outgoing particles is derived from the general structure of the *T*-matrix element. If spin-orbit interaction is neglected polarization effects are only expected for the transfer of unlike nucleon pairs.

K. O. Thielheim und R. Beiersdorf, Institut für Reine und Angewandte Kernphysik der Universität Kiel:
Eigenschaften der starken Wechselwirkung in der Theorie großer Luftschauer

Results of threedimensional Monte Carlo Simulations of extensive air shower development are presented and compared with empirical data. The possibility to conclude on various strong interaction parameters is discussed.

H. Bock und H. Walenta, I. Physikalisches Institut der Universität Heidelberg:
Winkelverteilung der Kernphotoreaktion $^3He(\gamma, p)^2H$ (Angular Distribution of the Photonuclear Reaction $^3He(\gamma, p)^2H$)

The angular distribution of the photonuclear reaction $^3He(\gamma, p)^2H$ was measured with an exitation energy $E_x = 16$ to 27 MeV using a 32.5 MeV betatron. In agreement with a theoretical calculation of Bösch *et al.* we found for the coefficients of the distribution $f(\theta) = b\,(a/b + \sin^2\theta(1 + \beta \cdot \cos\theta + \gamma \cdot \cos^2\theta))$ the values: $a/b \leqq 0.14$; $\beta = 0.77$ $(+0.14; -0.07)$; $\gamma \leqq 0.30$. This was the first attempt to use spark chambers as a detection device for photonuclear reactions in the low energy range. We found it to be a promising new facility.

K. Fischer, Institut für Festkörper- und Neutronenphysik der Kernforschungsanlage Jülich:
Influence of the Interaction between Conduction Electrons at the Impurity Sites on the Kondo Effect

The *s-d* exchange model is generalized by taking into account (besides a spin independent potential scattering term) the interaction between the conduction electrons at the magnetic impurity sites, where it is most important. Employing the equation of motion approach in an approximation which is consistent with the factorization proposed by Nagoaka, the *t*-matrix for the scattering by a single magnetic impurity can be calculated at all temperatures. It turns out that it depends on the total spin at the impurity site, which (together with a trivial renormalization of the spin independent interaction) is determined self-consistently and which in general depends on temperature.

N. Angelescu, D. Grecu, and G. Nenciu, Institute for Atomic Physics, Bucharest, Romania:
On the Asymptotic Expansion of the Static Green's Function in Cubic Crystals

A method for obtaining the whole asymptotic series of a static Green's function is developed. The method is applied to fcc crystals.

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